Wastewater Utilities Division
Pollution Prevention Program

Update

for the Jewelry Manufacturing Code of Practice

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Pollution Prevention Techniques and Information for Albuquerque's Jewelry Manufacturing Industry

PICKLE PLATER

INSIDE

***Update** is provided by:*
City of Albuquerque
PWD/WWUD
Pollution Prevention Program

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Updates are made possible with the assistance of local jewelry manufacturers, suppliers, and several local and state governmental agencies.

Every business and governmental agency that has received a full Jewelry Manufacturing Code of Practice will receive Updates. The Updates are not published on any schedule, but are published as new information becomes available. All Updates are three-hole punched so that they can be placed into your Code's three-ring binder.

If you have any information to provide or any questions concerning the Update or the Jewelry Manufacturing Code please contact Dan Gates.

1. HAVING PROBLEMS WITH YOUR PICKLE PLATER?

Well, if you are you are not alone. Over the past year some jewelers have stopped using their pickle plater due to specific problems.

A. Some treat acid pickles as wastes, rather than a reusable material, and they are accumulating a large amount of dried waste pickle. Instead, if you plated out most of the metals the acid pickle can be reused. There is no need to dispose of any of the acid pickle.

B. The graphite anode. An anode needs to have a large surface area. If you use too small a graphite rod it will be rapidly broken down and the plating will be far from optimal. Also, a platinized titanium or iridium oxide anode can be used instead of the graphite (see 4. Pickle Plater Upgrade).

C. The plating process itself. Plating is accomplished by running an electrical current through the acid pickle solution. If the voltage is too high or too low plating will be inefficient. Too high a voltage can also cause the anode to break apart more rapidly. The best method of regulating the voltage is to use a rectifier. A voltage of 6 is typical for the process.

D. Boosting the acid pickle. Some new acid needs to be added to the plated solution. The pickle will loose strength and a certain pH needs to be maintained. To assist you determine and maintain a specific pH you can use pH strips or a pH meter. If you do not determine the acids optimal process pH you will not be able to maintain and use the plated acid. A simple method is to check the solution pH after electroplating and add enough acid to correct for the pH difference. After acid addition check to see if the appropriate pH has been reached.

E. When you have accumulated enough reclaimed metals you should triple rinse the metal and use the rinse water to make up for evaporated acid pickle. Triple rinsing will remove corrosive salts prior to reclamation and reduce the possibility that the material could be considered a hazardous waste. You may need to allow metal solids to settle before using the rinse water.

2. THE TROUBLE WITH ACID PICKLES

Acid Pickles, when used to clean sterling silver and copper based alloys, will contain a large amount of copper, typically a few thousand milligrams per liter (ppm), and some silver. Large concentrations of copper can cause problems for the City's treatment plant by disrupting the biological processes used, possibly resulting in a violation of the EPA's discharge requirements.

Due to their corrosiveness (if pH >2) acid pickles are hazardous wastes. These materials are also restricted from discharge to the treatment plant if the pH is >5. Yet, the primary reason not to discharge acid pickles is that they can be continuously reused and the copper can be removed and recycled.

The method for this reuse and recycling is to use an Acid Pickle Plater. The plater is used to plate out the metals from the acidic solution, and once the copper is removed the acid pickle can be reused. One local jeweler has been using the same acid pickle for nearly three years.
A typical plating system will use two 5 gallon buckets of acid pickle. As one bucket is being plated the second is being used. Plating can be done in the off hours, such as overnight. Once the system is established minimal maintenance is required.

3. Electroplating Waste?

The New Mexico Environment Department's Hazardous & Radioactive Materials Bureau has finally given the state's interpretation on this issue. The pickle plater, when used to recover metals for later recycling is a recovery process, not a manufacturing process. Thus, the recovered metals are not considered F006 electropating wastes.
This does not mean that the wastes aren't hazardous. If your acid pickles are corrosive (pH > 2), or contain 5 ppm (mg/L) or more of silver, your acid pickles are hazardous wastes.
The good news is that if acid pickles no longer fit the definition of a hazardous waste (i.e. having a pH greater than 12.5 or less than 2, or having 5 ppm or more of silver or other regulated metals), or <u>if the recovered material is sent to a recycler</u> the wastes may not be considered hazardous wastes.
There are three categories of hazardous waste generators.
(1) Conditionally Exempt Small Quantity Generators (generating less than 220 lbs. per month)
(2) Small Quantity Generators (generating more than 220 lbs. but less than 2,200 lbs. per month) the materials need to be manifested and an approved hauler needs to be used. Materials sent to recycling do not have to be factored in as hazardous wastes. This reduces the volume of hazardous wastes you generate and may put you into the CESQG generator status.
(3) Few Albuquerque businesses are Large Quantity Generators.
For more information on these classifications please contact the Pollution Prevention Program.

The positive side of using a pickle plater is that you can recycle metals and reuse the acid pickle. There is no reason to throw out acid pickles.

4. Pickle Plater Upgrade

See Section 5 of the Jewelry Manufacturing Code of Practice Materials. If you have been using an acid pickle plater here is some information on how to upgrade the process.
The old system uses a graphite anode, but the graphite tends to break down and requires replacement. What you can do is replace the graphite anode with a platinized titanuim or iridium oxide mesh. The mesh greatly increases the surface area of the anode (a primary concern when considering the efficiency of the system, you want to maximize anode surface area) and will last far longer than graphite (some say it should last the life of your business), when used properly.
The mesh is available from electroplating supply houses, but call around since prices may vary greatly. A mesh sheet the size of 2 square feet (4" x 6" appx.) should be sufficient, but you can go larger. Expect to pay around $200, but remember that the mesh should last far longer than graphite, and in the long run it will cost less than continually replacing graphite anodes.
After contacting several suppliers, one supplier of platinized titanium (appx. $150.00, best for this application) and iridium oxide (appx. $125.00) mesh is:
Electrode Products, Inc. (Kate Higgins) (732)302-1686

(The city of Albuquerque does not endorse any company, products or services provided by any business mentioned)

Some construction will be needed to connect the mesh to the system. See 10. Pickle Plater Construction.

5. Why are Acid Pickles Regulated?

- **Pickles having a pH less than 2** are considered corrosive and therefore hazardous. Proper disposal is required. It cannot be discharged to the sewer system if less than pH 5.
- **Silver at 5 mg/L (ppm) or greater** Considered hazardous and cannot be discharged to the sewer system
- **Copper greater than 16.5 mg/L** cannot be discharged to the sewer system

6. Sulfide

Recently a local jeweler was having a problem with his recirculating mass finishing process turning his silver gray. The suspect was sulfide being generated somewhere in the manufacturing process.

The jeweler has a system that settles out the heavier process waste and recirculates the water to the process. The recirculating process involves the use of three settling tanks. These settling tanks were used to clarify the water prior to reuse in the mass finishing process.

The problem appeared to be one where hydrogen sulfide was possibly being produced in the settling tanks. "Calcium sulfate, sulfites, and sulfur in water containing little or no oxygen will be reduced to sulfides by anaerobic sulfur bacteria or biochemical action, resulting in liberation of hydrogen sulfide. This is more likely to occur in water at a pH of 5.5 to 8.5, and particularly in water permitted to stand or in water obtained from close to the bottom of deep reservoirs. Organic matter *(such as investment, finishing media and chemical additives)* often contains sulfur that, when attacked by sulfur bacteria in the absence of oxygen, will release hydrogen sulfide." (from: Treatment of Water-Design and Operation Control, page 379)

Sulfide can be reduced by using 0.3 mg/L (by volume) of chlorine in the sulfate contaminated water. Aeration will also control the formation of sulfides, but may not be entirely effective. A combination of chlorination and aeration may be needed to control hydrogen sulfide.

7. Sulfide and Sludge

Sludges can also generate sulfides. This is typically found when the sludge is disturbed and a strong smell of rotten eggs is present. This typically occurs when the sludge has been sitting for a long period of time and/or the temperature has been very warm for a period of time.

The sulfides in the sludge should not pose a serious process problem, unless the sludge is disturbed and you reuse the water in a process.

The generation of sulfide in sludge wastes can also be termed >gone septic'. This means that the sludge has a very limited oxygen supply and the anaerobic bacteria is breaking down the organics and generating hydrogen sulfide. By cleaning the sludge from the settling tank(s) more often you can reduce the amount of hydrogen sulfide being generated. Yet, be sure to clean in the corners since these are areas more difficult to clean. If you don't get the corners you may still have sulfides eventhough you just cleaned the tank(s).

8. Translations

Thanks must go to:

- Mathew O'Grady, Utilities Manager & Tim West O&M Director, County of Bernalillo Public Works Division, O&M Department (*Jewelry Code* and *Are You Pouring* Spanish Translations)
- Jezlaine Jewelers
- Ms. Yen Nguyen, Albuquerque Dept. of Family & Community Services.

With their hard work and assistance the Pollution Prevention Program now has several documents in Spanish and in Vietnamese. These documents currently include:

Jewelry Manufacturing Code of Practice Introduction & Checklist (Spanish)

Are You Pouring fliers (Spanish & Vietnamese)

Do Not Pour Acid Down the Drain (warning notes to place over sinks and drains - Spanish & Vietnamese)

No Tirar Acido Dentro del Drenaje

If you are interested in receiving any of these materials or would like to provide additional translations that you may be using in your business please contact the Program at (505)873-7004.

9. Update your Address

The Pollution Prevention Program is staffed by three people. These three work with a wide variety of businesses. The ability to maintain updated databases of local businesses is a necessity. If you move to another location or if you terminate your business the Program would appreciate notification. This will reduce the amount of secondary mailings and reduce the time spent on tracking down moved or out-of-business locations. This will allow us to continue providing you with useful and realistic pollution prevention information.

Also, if your business name is incorrect or you received more than one newsletter please notify the Program of any corrections or cross-references by calling (505)873-7059/7058.

10. Pickle Plater Construction

The platinized or iridium oxide screen should have a connector that is not coated with platinum or other material. This is where you will connect to the anode screen. You need to protect the titanium connection from the acid solution. A good material for this is silicon. On a piece of plastic you can make a wax dam around where the silicon will go. Once the dam is ready you can pour in the silicon and let dry.

Silicon is good because it will resist the acid and you can see the connection which makes it easier to visually inspect for any damage. The silicon should extend past the titanium/screen connection and should encompass a small area of the screen to fully protect the titanium connection.

You can then crimp or use aligator clips and make the connection to the rectifier. Following are some basic diagrams to help establish the use of the platinized titanium anode.

It is recommended that if you are going to attempt making and using a pickle plater that you educate yourself on the electroplating process. You could spend $200.00 on an anode that should last the life of your business and destroy it in a

very short time or not recover any metals from the pickle simply by not understanding the electroplating process.

PICKLE PLATERS ON LOAN

Soon, we will have two pickle plating units available for loan. The units will be loaned out to Albuquerque jewelers who are interested in trying the system, but not wanting to purchase the equipment necessary to build their own at this time. The loan period will likely run one month. There will be no cost for the use of the plating unit except for your time and electricity. If you decide that the plater works for your business we will assist you in setting up a unit.

If you are interested in trying a unit please contact Dan Gates at 873-7059 and you will be put on the list and given a scheduled month.